

What is claimed is:

1. A recording medium comprising a light transmission recording material, wherein said light transmission recording material includes a recording area in which information is to be recorded by at least one of a change of refractive index or a change of extinction coefficient.

2. A recording medium comprising a light transmission recording material, wherein said light transmission recording material includes a recording area in which information is to be recorded by at least a change of transmittance or a change of reflectance.

3. A recording medium comprising at least one of a light transmission substrate and a light transmission protecting film and a recording area in which information A is to be recorded, wherein at least one of said light transmission substrate or said light transmission protecting film has a recording area in which information B is to be recorded by at least either a change of refractive index or a change of extinction coefficient.

4. A recording medium comprising at least one of a light transmission substrate and a light transmission protecting film and a recording area in which information A is to be recorded, wherein at least one of said light transmission substrate or said light transmission protecting film includes a recording area in which

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information B is to be recorded by at least either a change of transmittance or a change of reflectance.

5. A recording medium according to claim 1, wherein said light transmission recording material is a light transmission recording material in which at least one of refractive index or extinction coefficient is changed with irradiation of ultraviolet rays.

6. A recording medium according to claim 2, wherein said light transmission recording material is a light transmission recording material in which at least one of transmittance or reflectance is changed with irradiation of ultraviolet rays.

7. A recording medium according to claim 3, wherein said light transmission substrate or said light transmission protecting film is a light transmission recording material in which at least one of refractive index or extinction coefficient is changed with irradiation of ultraviolet rays.

8. A recording medium according to claim 4, wherein said light transmission substrate or said light transmission protecting film is a light transmission recording material in which at least one of transmittance or reflectance is changed with irradiation of ultraviolet rays.

9. A recording medium according to claim 1, wherein said light transmission recording material is a light transmission recording

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said light transmission recording material is made of any one of resin substrates of polycarbonate resin, polyolefin resin, polymethyl methacrylate resin, epoxy resin and acrylic resin or glass substrate.

15. A recording medium according to claim 3 or 4, wherein said light transmission protecting film is made of polycarbonate resin, polyolefin resin, polymethyl methacrylate resin, epoxy resin, ultraviolet-curing resin, thermosetting resin, photopolymer resin or sheet made of glass or a coated film.

16. A recording medium according to claim 1 or 2, wherein said information is information containing inherent identification information.

17. A recording medium according to claim 3 or 4, wherein said information B contains inherent identification information.

18. A recording medium according to claim 1 or 2, wherein said information contains at least one of numeral, character, image and bar code.

19. A recording medium according to claim 3 or 4, wherein said information B contains at least one of numeral, character, image and bar code.

20. A recording medium according to claim 1 or 2, wherein

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information, reproduction number limiting information and user authentication information.

24. A recording medium according to claim 3 or 4, wherein said recording area of information A has information concerning said information B recorded thereon.

25. A recording medium according to claim 3 or 4, wherein said recording area of information A has information concerning recording of said information B recorded thereon and said information is more than any one of existence of recording of said information B, recording position, recording power and reproducing power.

26. A recording medium according to claim 3 or 4, wherein said recording area of said information A is a recording area in which said information is to be recorded with irradiation of light having a wavelength λ_{ra} and said information A is to be reproduced with irradiation of light having a wavelength λ_{pa} , said light transmission substrate or said light transmission protecting film is a light transmission substrate or a light transmission protecting film in which said information B is to be recorded with irradiation of light having a wavelength λ_{rb} and said information B is to be reproduced with irradiation of light having a wavelength λ_{pb} and said light transmission substrate or said light transmission protecting film has transmittance of more than 50% relative to light having a recording wavelength λ_{ra}

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of said information A and light having a reproducing wavelength λ_{pa} of said information A.

27. A recording medium according to claim 3 or 4, wherein said recording area of said information A is a recording area in which said information A is to be recorded with irradiation of light having a wavelength λ_{ra} and said information A is reproduced with irradiation of light having a wavelength λ_{pa} , said light transmission substrate or said light transmission protecting film is a light transmission substrate or a light transmission protecting film in which said information B is recorded with irradiation of light having a wavelength λ_{rb} and said information B is to be reproduced with irradiation of light having a wavelength λ_{pb} and said light transmission substrate or said light transmission protecting film has transmittance less than 50% relative to light having said wavelength λ_{rb} at which said information B is recorded.

28. A recording medium according to claim 3 or 4, wherein said recording area of said information A is a recording area in which said information A is to be recorded with irradiation of light having a wavelength λ_{ra} and said information A is to be reproduced with irradiation of light having a wavelength λ_{pa} , said light transmission substrate or said light transmission protecting film is a light transmission substrate or a light transmission protecting film in which

wherein said recording area of said information A is a recording area in which said information A is to be recorded with irradiation of light having a wavelength λ_{ra} and said information A is to be reproduced with irradiation of light having a wavelength λ_{pa} , said light transmission substrate or said light transmission protecting film is a light transmission substrate or a light transmission protecting film in which said information B is to be recorded with irradiation of light having a wavelength λ_{rb} and said information B is to be reproduced with irradiation of light having a wavelength λ_{pb} and said λ_{ra} , λ_{pa} , λ_{rb} , λ_{pb} satisfy any one relationship or more of $\lambda_{ra} = \lambda_{pa}$, $\lambda_{ra} \neq \lambda_{pa}$, $\lambda_{rb} = \lambda_{pb}$, $\lambda_{rb} \neq \lambda_{pb}$, $\lambda_{ra} = \lambda_{rb}$, $\lambda_{ra} \neq \lambda_{rb}$, $\lambda_{pa} = \lambda_{pb}$, $\lambda_{pa} \neq \lambda_{pb}$, $\lambda_{ra} = \lambda_{pb}$, $\lambda_{ra} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{rb}$, $\lambda_{pa} \neq \lambda_{rb}$.

33. An optical recording medium according to claim 3 or 4, wherein said recording area of said information A is a recording area in which information A is to be reproduced with irradiation of light having a wavelength λ_{pa} or information A is to be reproduced without irradiation of light, said light transmission substrate or said light transmission protecting film is a light transmission substrate or a light transmission protecting film in which said information B is to be recorded with irradiation of light having a wavelength λ_{rb} and said information B is to be reproduced with irradiation of light having a wavelength λ_{pb} and said λ_{pa} , λ_{rb} , λ_{pb} satisfy any one relationship or more of $\lambda_{rb} = \lambda_{pb}$, $\lambda_{rb} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{pb}$, $\lambda_{pa} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{rb}$, $\lambda_{pa} \neq \lambda_{rb}$.

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34. A recording medium according to claim 1 or 2, wherein said recording area is a recording area in which information is to be recorded by at least any of a change of multi-value refractive index or a change of multi-value extinction coefficient or by at least any of a change of multi-value transmittance or a change of multi-value reflectance.

35. A recording medium according to claim 3 or 4, wherein said information B is to be recorded by at least any one of a change of multi-value refractive index or a change of multi-value extinction coefficient or by at least any one of a change of multi-value transmittance or multi-value reflectance.

36. A recording medium according to claim 1 or 2, wherein said recording area is a recording area in which information is to be recorded by a continuous change of multi-value refractive index or by a continuous change of multi-value extinction coefficient or by a continuous change of multi-value transmittance or by a continuous change of multi-value reflectance.

37. A recording medium according to claim 3 or 4, wherein said information B is to be recorded by at least any of a continuous change of multi-value refractive index or a continuous change of multi-value extinction coefficient or by at least any of a continuous

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one of changes of ultraviolet ray irradiation time, ultraviolet ray irradiation time and ultraviolet ray irradiation light amount.

41. A recording medium according to claim 3 or 4, wherein said information B is to be recorded by at least any one of a continuous change of multi-value refractive index or a continuous change of multi-value extinction coefficient or a continuous change of multi-value transmittance or a continuous change of multi-value reflectance recorded by at least one of changes of ultraviolet ray irradiation time, ultraviolet ray irradiation time and ultraviolet ray irradiation light amount.

42. A recording medium according to claim 3 or 4, wherein said inherent identification information is to be recorded by a combination of said information A and said information B.

43. A recording medium according to claim 3 or 4, wherein said inherent identification information is to be recorded by a combination of said information A and said information B and said inherent identification information contains at least one information of management information of recording medium, management information of recording information, recording disapproving information, reproduction disapproving information, true and false information of recording medium, recording number limiting information, reproduction number limiting information and user authentication information.

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44. A recording and reproducing method for recording and reproducing information on and from a recording medium including a light transmission recording material and said light transmission recording material has a recording area in which information is to be recorded by at least one of a change of refractive index or a change of extinction coefficient said method comprising a step of irradiating light on said recording medium in order to record or reproduce said information.

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45. A recording and reproducing method for recording and reproducing information on and from a recording medium including a light transmission recording material and said light transmission recording material has a recording area in which information is to be recorded by at least one of a change of transmittance or a change of reflectance, said method comprising a step of irradiating light on said recording medium in order to record or reproduce said information.

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46. A recording and reproducing method for recording and reproducing information on and from a recording medium including at least one of a light transmission substrate and a light transmission protecting film and at least one of said light transmission substrate and said light transmission protecting film includes a recording area in which information B is to be recorded by at least one of a change of refractive index or a change of extinction coefficient, said method comprising a step of irradiating light on said recording medium in

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order to record or reproduce said information B.

47. A recording and reproducing method for recording and reproducing information on and from a recording medium including at least one of a light transmission substrate and a light transmission protecting film and a recording area of information A, wherein at least one of said light transmission substrate or said light transmission protecting film includes a recording area in which information B is recorded by at least one of a change of transmittance and a change of reflectance; said method comprising a step of irradiating light on said recording medium in order to record or reproduce said information B.

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48. A recording and reproducing method for recording and reproducing information on and from a recording medium including a light transmission recording material and said light transmission recording material has a recording area in which information is to be recorded by at least one of a change of refractive index or a change of extinction coefficient, wherein electron beams are irradiated on said recording medium in order to record said information.

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49. A recording and reproducing method for recording and reproducing information on and from a recording medium including a light transmission recording material and said light transmission recording material has a recording area in which information is to be recorded by at least one of a change of transmittance or a change

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of reflectance, said method comprising a step of irradiating electron beams on said recording medium in order to record said information.

50. A recording and reproducing method for recording and reproducing information on and from a recording medium including at least one of a light transmission substrate and a light transmission protecting film and a recording area of information A and at least one of said light transmission substrate and said light transmission protecting film includes a recording area in which information B is to be recorded by at least one of a change of refractive index or a change of extinction coefficient, said method comprising a step of irradiating electron beams on said recording medium in order to record said information B.

51. A recording and reproducing method for recording and reproducing information on and from a recording medium including at least one of a light transmission substrate and a light transmission protecting film and a recording area of information A and at least one of said light transmission substrate and said light transmission protecting film includes a recording area in which information B is to be recorded by at least one of a change of transmittance or a change of reflectance, said method comprising a step of irradiating electron beams on said recording medium in order to record said information B.

52. A recording and reproducing method according to claim

44 or 45, wherein said recording medium is irradiated with ultraviolet rays in said light irradiation step.

53. A recording and reproducing method according to claim 46 or 47, wherein said recording medium is irradiated with ultraviolet rays in said light irradiation step.

54. A recording and reproducing method according to claim 44 or 45, wherein said light transmission recording material is irradiated with reproducing light and said information is reproduced by a change of light amount of passing light of said reproducing light or a change of light amount of reflected light of said reproducing light in said light irradiation step.

55. A recording and reproducing method according to claim 46 or 47, wherein said light transmission recording material is irradiated with reproducing light and said information B is reproduced by a change of light amount of passing light of reproducing light or a change of light amount of reflected light in said light irradiation step.

56. A recording and reproducing method according to claim 46 or 47, wherein said information A is recorded with irradiation of light having a wavelength λ_{ra} and said information A is reproduced with light having a wavelength λ_{pb} in said light irradiation step,

said information B is recorded with irradiation of light having a wavelength λ_{rb} and said information B is reproduced with irradiation of light having a wavelength λ_{pb} in said light irradiation step and said λ_{ra} , λ_{pa} , λ_{rb} , λ_{pb} satisfy more than any one of relationship of $\lambda_{ra} = \lambda_{pa}$, $\lambda_{ra} \neq \lambda_{pa}$, $\lambda_{rb} = \lambda_{pb}$, $\lambda_{rb} \neq \lambda_{pb}$, $\lambda_{ra} = \lambda_{rb}$, $\lambda_{ra} \neq \lambda_{rb}$, $\lambda_{pa} = \lambda_{pb}$, $\lambda_{pa} \neq \lambda_{pb}$, $\lambda_{ra} = \lambda_{pb}$, $\lambda_{ra} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{rb}$, $\lambda_{pa} \neq \lambda_{rb}$.

57. A recording and reproducing method according to claim 46 or 47, wherein said recording medium has a recording area of said information A in which said information A is reproduced with irradiation of light having a wavelength λ_{pa} and said information A is reproduced without irradiation of light, said information B is recorded on said light transmission substrate or said light transmission protecting film with irradiation of light having a wavelength λ_{rb} and said information B is reproduced from said light transmission substrate or said light transmission protecting film with irradiation of light having a wavelength λ_{pb} in said light irradiation step and said λ_{pa} , λ_{rb} , λ_{pb} satisfy more than any one relationship of $\lambda_{rb} = \lambda_{pb}$, $\lambda_{rb} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{pb}$, $\lambda_{pa} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{rb}$, $\lambda_{pa} \neq \lambda_{rb}$.

58. A recording and reproducing method according to claim 46 or 47, wherein said light irradiation step includes a step of reproducing information B and a step of recording or reproducing information A based on reproducing information of said information

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59. A recording and reproducing method according to claim 46 or 47, wherein said information B contains inherent identification information and said light irradiation step includes a step of recording or reproducing information A based on reproducing information of said inherent identification information of said information B.

60. A recording and reproducing method according to claim 46 or 47, wherein said information B contains inherent identification information, said inherent identification information contains at least one of management information of recording medium, management information of recording information, recording disapproving information, reproduction disapproving information, true and false information of recording medium, recording number limiting information, reproduction number limiting information and user authentication information and said light irradiation step includes a step of recording or reproducing information A based on reproducing information of said inherent identification information of said information B.

61. A recording and reproducing method according to claim 46 or 47, wherein said recording area of said information A includes information relating to said information B and said light irradiation step includes a step of reproducing information relating to said information B of said information A, a step of reproducing said information B based on information relating to said information B and a step of recording or reproducing said information A by judgment based

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on reproduced information of said information B.

62. A recording and reproducing method according to claim 44 or 45, wherein said light irradiation step includes a step of recording said information as information based on at least any one of a change of multi-value refractive index or a change of multi-value extinction coefficient or at least one of a change of multi-value transmittance or a change of multi-value reflectance by at least one of a change of ultraviolet ray irradiation time, ultraviolet ray irradiation intensity and light amount of irradiated ultraviolet rays.

63. A recording and reproducing method according to claim 46 or 47, wherein said light irradiation step includes a step of recording said information B as information based on at least any one of a change of multi-value refractive index or a change of multi-value extinction coefficient or at least any one of a change of multi-value transmittance or a change of multi-value reflectance by at least a change of ultraviolet ray irradiation time, ultraviolet ray irradiation intensity and light amount of irradiated ultraviolet rays.

64. A recording and reproducing method according to claim 44 or 45, wherein said light irradiation step includes a step of reproducing information B by at least any one of a change of multi-value refractive index or a change of multi-value extinction coefficient or by at least any one of a change of multi-value transmittance or a change of multi-value reflectance and said

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passing light or a continuous change of multi-value light amount of reflected light of reproducing light irradiated on said recording medium is detected by said reproducing step.

70. A recording and reproducing apparatus including light irradiating means for recording or reproducing information by irradiating light on a recording medium including a light transmission recording material and said light transmission recording material including a recording area in which said information is to be recorded or reproduced by at least any one of a change of refractive index or a change of extinction coefficient.

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71. A recording and reproducing apparatus including light irradiating means for recording or reproducing information by irradiating light on a recording medium including a light transmission recording material and said light transmission recording material includes a recording area in which information is to be recorded by at least any one of a change of transmittance or a change of reflectance.

72. A recording and reproducing apparatus including light irradiating means for recording or reproducing at least information B by irradiating light on a recording medium including at least any one of a light transmission substrate and a light transmission protecting film and a recording area of information A and at least one of said light transmission substrate or said light transmission protecting film includes a recording area in which said information B is to be

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recorded by at least any one of a change of refractive index or a change of extinction coefficient.

73. A recording and reproducing apparatus including light irradiating means for recording or reproducing at least information B by irradiating light on a recording medium including at least one of a light transmission substrate and a light transmission protecting film and a recording area of information A and at least one of said light transmission substrate or said light transmission protecting film includes a recording area in which said information B is to be recorded by at least one of a change of transmittance or a change of reflectance.

74. A recording and reproducing apparatus including an electron beam irradiating section for recording information by irradiating electron beams on a recording medium including a light transmission recording material and said light transmission recording material includes a recording area in which said information is to be recorded by at least any one of a change of refractive index or a change of extinction coefficient.

75. A recording and reproducing apparatus including an electron beam irradiating section for recording information by irradiating electron beams on a recording medium including a light transmission recording material and said light transmission recording material includes a recording area in which said information is to be recorded

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by at least any one of a change of transmittance or a change of reflectance.

76. A recording and reproducing apparatus including an electron beam irradiating section for recording at least information B by irradiating electron beams on a recording medium including at least one of a light transmission substrate and a light transmission protecting film and a recording area of information A and at least one of said light transmission substrate or said light transmission protecting film includes a recording area in which said information B is to be recorded by at least one of a change of refractive index or a change of extinction coefficient.

77. A recording and reproducing apparatus including an electron beam irradiating section for recording at least information B by irradiating electron beams on a recording medium including at least one of a light transmission substrate and a light transmission protecting film and at least one of said light transmission substrate or said light transmission protecting film includes a recording area in which said information B is to be recorded by at least one of a change of transmittance or a change of reflectance.

78. A recording and reproducing apparatus according to claim 70, 71, 72 or 73, wherein said light irradiating means records information by changing at least any one of light intensity, light amount, irradiation pattern and irradiation time in response to recording information.

83. A recording and reproducing apparatus according to claim 72 or 73, further comprising recording and reproducing means for recording said information A by irradiating light having a wavelength λ_{ra} and reproducing said information A by irradiating light having a wavelength λ_{pa} and recording said information B by irradiating light having a wavelength λ_{rb} and reproducing said information B by irradiating light having a wavelength λ_{pb} and said λ_{ra} , λ_{pa} , λ_{rb} , λ_{pb} satisfy more than any one of relationship of $\lambda_{ra} = \lambda_{pa}$, $\lambda_{ra} \neq \lambda_{pa}$, $\lambda_{rb} = \lambda_{pb}$, $\lambda_{rb} \neq \lambda_{pb}$, $\lambda_{ra} = \lambda_{rb}$, $\lambda_{ra} \neq \lambda_{rb}$, $\lambda_{pa} = \lambda_{pb}$, $\lambda_{pa} \neq \lambda_{pb}$, $\lambda_{ra} = \lambda_{pb}$, $\lambda_{ra} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{rb}$, $\lambda_{pa} \neq \lambda_{rb}$.

84. A recording and reproducing apparatus according to claim 72 or 73, further comprising recording and reproducing means for reproducing information A by irradiation of light having a wavelength λ_{pa} or reproducing information A without irradiation of light, recording information B by irradiation of light having a wavelength λ_{rb} and reproducing information B by irradiation of light having a wavelength λ_{pb} and said λ_{pa} , λ_{rb} , λ_{pb} satisfy more than any one relationship of $\lambda_{rb} = \lambda_{pb}$, $\lambda_{rb} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{pb}$, $\lambda_{pa} \neq \lambda_{pb}$, $\lambda_{pa} = \lambda_{rb}$, $\lambda_{pa} \neq \lambda_{rb}$.

85. A recording and reproducing apparatus according to claim 70, 71, 72 or 73, wherein said light irradiation means records part of or whole of said information as information based on at least one change of multi-value refractive index or at least one change of

multi-value extinction coefficient or at least one change of multi-value transmittance or at least one change of multi-value reflectance by at least one of ultraviolet ray irradiation time, ultraviolet ray irradiation intensity and ultraviolet ray irradiation light amount.

86. A recording and reproducing apparatus according to claim 83 or 84, wherein said wavelength λ_{ra} , λ_{pa} , λ_{rb} , λ_{pb} satisfy equalities and inequalities of $300 \text{ nm} \leq \lambda_{ra}$ and $\lambda_{pa} \leq 900 \text{ nm}$ or equalities and inequalities of $100 \text{ nm} \leq \lambda_{rb}$ and $\lambda_{pb} \leq 500 \text{ nm}$.

87. A recording and reproducing apparatus according to claim 70, 71, 72 or 73, wherein said light irradiating means records part of or whole of said information as information based on at least any one of a continuous change of multi-value refractive index or a continuous change of multi-value extinction coefficient or at least any one of a continuous change of multi-value transmittance or a continuous change of multi-value reflectance by at least one change of ultraviolet ray irradiation time, ultraviolet ray irradiation intensity and ultraviolet ray irradiation light amount.

88. A recording and reproducing apparatus according to claim 70, 71, 72 or 73, wherein said light irradiating means records part of or whole of said information as information based on at least any one of a change of multi-value refractive index or a change of multi-value extinction coefficient or at least any one of a change of multi-value

92. A recording and reproducing apparatus according to claim 70, 71, 72 or 73, wherein said light irradiating means includes an objective lens and said objective lens outputs focusing and tracking servo signals by focusing ultraviolet ray laser light on said recording medium.

93. A recording and reproducing apparatus according to claim 72 or 73, wherein said light irradiating means includes a light source section for generating recording and reproducing light of said information A and a light source section for generating recording and reproducing light of said information B and said recording and reproducing light of said information A and said recording and reproducing light of said information B have wavelengths different from each other.

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